SCIENCE 7

STUDENT SUPPORT GUIDE

MODULE 6:
EVIDENCE OF EROSION

Distance Learning

Alberta EDUCATION

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ACKNOWLEDGEMENTS

This module has been based on **Science Directions 7** by John Wiley & Sons/Arnold Publishing Ltd., 1989. Program consultant was Douglas A. Roberts. The author team for the complete text included Wilson C. Durward, Eric S. Grace, Gene Krupa, Mary Krupa, Alan J. Hirsch, David A.E. Spalding, Bradley J. Baker, and Sandy M. Wohl. Contributing author was Jean Bullard. Portions of **Science Directions 7** have been used throughout and have been adapted in a variety of ways.

Cover photographs courtesy of Dave Mussell, Edmonton.

Note to the Parent or Guardian

This Science Student Support Guide contains answers to activities in the accompanying Module Booklet. It should be kept secure by the parent or guardian if the student is under 16 years of age. Younger students should not have access to this Guide except under supervision.

This Student Support Guide does not contain the answers to the accompanying Assignment Booklet. The Assignment Booklet will be graded by the student's distance education teacher.

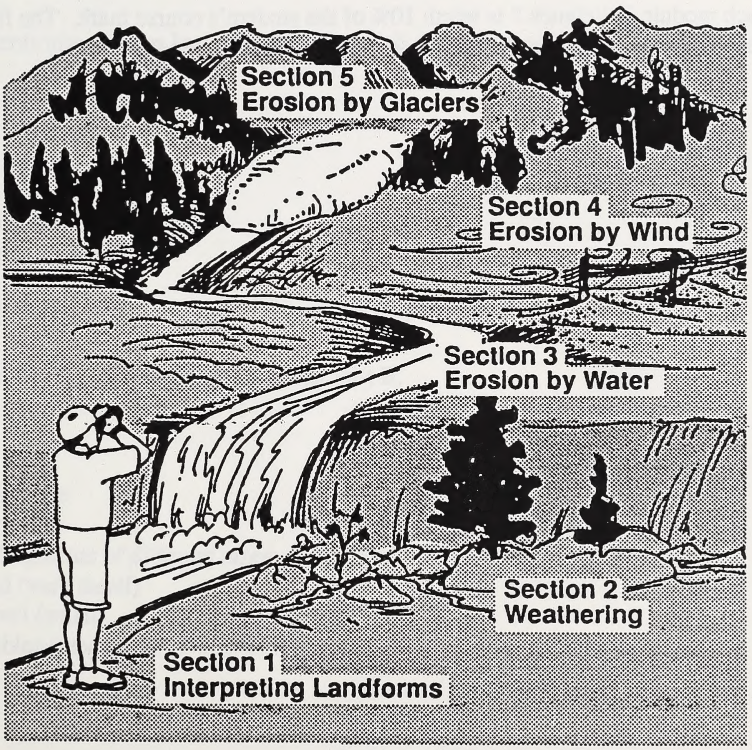
Science 7
Student Support Guide
Module 6
Evidence of Erosion
Alberta Distance Learning Centre
ISBN No. 0-7741-0413-9

Module 6 – Evidence of Erosion: Overview

The major emphasis of this module is on the nature of science. However, opportunities are also present to support the science and technology emphasis as well as the science, technology, and society aspects of the Science 7 program.

In this module students learn about how scientists study and explain changes to the Earth's surface brought about by the erosion, transport, and deposition of earth materials. Students develop an awareness and appreciation of how the Earth's surface gradually changes over long periods of time. They also learn how humans depend on the physical aspects of Earth, yet at the same time can affect the speed at which changes to the physical Earth occur.

In Module 6 students will experiment with models, such as stream tables, to test different variables to learn more about how changes can occur to the Earth's surface. By doing so they become more familiar with such scientific processes as observing and predicting, and learn how to make inferences about how the landscape has changed on the basis of evidence from data gathered.



Evaluation

The student's successful completion of all assignments will depend on practice obtained while doing the various activities. Many choices of activities have been provided so that students have some control over their own learning.

The following distribution of marks will determine the student's grading for this module.

ASSIGNMENT	VALUE
Section 1 Assignment	0 Marks
Section 2 Assignment	34 Marks
Section 3 Assignment	21 Marks
Section 4 Assignment	20 Marks
Section 5 Assignment	25 Marks
TOTAL	100 Marks

Note: There is no assignment to be completed for Section 1.

Each module in Science 7 is worth 10% of the student's course mark. The final test, based on the learnings from all six modules, is worth 40% of the total final grading.

Materials Needed for Module 6

Comment:

For a complete overview of the materials needed for Module 6 and how the topics are developed, it may be helpful to preview the contents of Module 6. In some cases if the materials suggested are not readily available, the learning facilitator may be able to substitute suitable materials for the student so that the activities can be completed successfully.

The materials needed for Module 6 and the activities in which they are to be used are as follows:

Section 2: Activity 1

- plastic bottle with screw top
- plastic bag
- water
- freezer

Section 2: Activity 2

Note: Students may choose Part A, or Part B which does not require any materials.

Part A

- two uncoated iron nails
- glass of water
- two pieces of chalk
- bottle of soda pop

Section 3: Activity 1

Note: Students may choose either Part A or Part B.

Part A

- stream table
- water
- rock fragments of different sizes:
  - sand (very small)
  - gravel (small)
  - pebbles (medium)

Part B

- large transparent jar with lid
- water
- rock fragments of different sizes:
  – sand (very small)
  – fine gravel (small pieces of gravel)
  – pebbles (medium pieces of gravel)

Section 3: Activity 2

- transparent jar with lid
- water
- mixture of rock fragments:
  - sand
  - silt
  - small gravel

Section 3: Activity 4

- small jar or can
- water
- graduated cylinder or measuring cup
- soil samples:
  - dry gravel
  - dry sand
  - dry potting soil
  - dry garden soil
  - dry clay

Section 3: Activity 5

- shallow container that will hold water (minimum $30 \times 20 \times 5$ cm)
- open-ended plastic or metal tubing, about 1 cm in diameter
- sand
- water
- beaker or other convenient small container

Section 3: Enrichment

- stream table or large plastic pail to catch the water and rock particles
- gold pan (or metal pie plate)
- gravel of mixed sizes
- sand
- lead shot, or another heavy substitute for gold
- water

Section 4: Activity 1

- drinking straws
- dry sand
- newspaper

Section 4: Activity 2

- hand-held hair dryer or small fan
- soil samples
- long, shallow box or tray (can be made by cutting down a large cardboard box to about 5 to 10 cm)
- plastic cup
- weights to hold cup in place

Section 5: Activity 3

- sand
- gravel
- several ice cubes
- several ice cubes made from water mixed with gravel
- several ice cubes made from water mixed with coarse sand
- plastic bucket
- piece of cardboard

Section 5: Extra Help

- modelling clay

The remainder of this Student Support Guide for Module 6 contains the answers and guidance to assist you in correcting the student's work in the Activities. So that the learning facilitator (parent/guardian) does not have to keep referring to the Student Module Booklet, the questions are reprinted from the Student Module Booklet, and the suggested answers are printed in italics. Comments where applicable are made to guide the learning facilitator.

Correct and discuss the answers with the student as the student completes each activity. In this way the student receives immediate feedback to clarify and reinforce basic understanding before moving on to the next activity.

Towards the end of each section there are Follow-up Activities. Here the activities are separated into two strands: Extra Help and Enrichment. If students had some difficulties understanding the concepts and the activities within the sections, it is recommended that they do the Extra Help. If students had a clear understanding of the concepts and had few difficulties completing the section activities, it is recommended that they do the Enrichment. As the learning facilitator, you should assist the student in choosing the appropriate path in the Follow-up Activities.

The assignments in the Assignment Booklet are to be done under the supervision of a learning facilitator. Ensure that the student always supplies his or her own written responses in the Assignment Booklet. Because these are not tests, the students can refer to the Module Booklet and any additional notes that have been made. Assignments are always marked by a teacher. Wait until all the assignments are completed before submitting the Assignment Booklet.

Section 1: Interpreting Landforms

By the end of this section students should be able to

- recognize evidence of changes in the Earth's surface
- describe some features that result from changes in the Earth's surface
- understand some of the effects of these changes if they occur over a very long period of time
- understand that scientific knowledge builds up and changes over time.

Section 1: Activity 1

Comments:

For this activity students need to examine three photographs in their textbook. For each photograph they should

- describe their observations
- infer the changes they think have occurred
- explain what they think caused the change

1. Examine the photograph on the bottom left corner on page 297 of *Science Directions 7*. It shows a lady standing beside a hoodoo.

   a. Observations (Describe the appearance of a hoodoo.)

   Answers will vary. Hoodoos such as this one are tall shapes made of rock that stand separately from the rocks around them. Hoodoos usually have a cap rock on top. The rock is in layers.

   b. Inferences and Explanations (How do you think this formation was formed?)

   Answers will vary. Students may suggest wind or water erosion as being factors in the formation of hoodoos; water erosion is generally the main factor.

2. Examine the photograph on the top right corner of page 297 of *Science Directions 7*. It shows a waterfall.

   a. Observations (Describe what you observe about where the water flows and what is around it.)

   The water flows over the falls and between the rocks on either side.

   b. Inferences and Explanations

   Answers will vary. The water is pulled down by the force of gravity. The waterfall wears away rocks on the bottom and sides of the falls.

3. Examine Photograph B on page 299 of *Science Directions 7*. It shows an avalanche.

   a. Observations (What is happening in this picture?)

      Snow is sliding down the mountainside.

   b. Inference and Explanations (What do you think makes this happen?)

      Answers will vary. The weight of the thick layers of snow causes the snow to break free and slide down the mountain. Sometimes there is a trigger event that sets off the slide, such as a loud noise or the movement of a rock or an animal. Avalanches usually occur after there has been repeated partial melting and refreezing of the snow.

Section 1: Activity 2

1. Joanne wanted to explain what she saw and tell why it happened. What did she see that she wanted to explain?

   She wanted to explain the changes she saw in the park by the school.

2. How did she explain what she saw? Write two inferences (explanations) that Joanne made.

   - inference one – Joanne thought that *the paths were made by students.*
   - inference two – Joanne thought that *the rain deepened the paths.*

3. What did Joanne observe that supports these inferences?

   - inference one – *She observed that the grass was worn where people walked most often.*
   - inference two – *She observed the water running down the paths and the paths getting deeper.*

4. What might happen if the paths are used for many years without being paved?

   The paths might become deeper.

5. List two examples of other small and slow changes that can change the shape of the land. If you can, think of examples from around where you live.

   Answers for questions 5 and 6 will vary. The following are possible answers.

   - *the wearing away of a river valley*
   - *small gullies in a field getting larger after repeated rainfalls*
   - *the wearing down of a mountaintop*
   - *topsoil blowing in the wind*

6. Name or describe two examples of sudden changes that affect the shape of the land.

   - *an avalanche*
   - *an earthquake*
   - *a landslide*

Section 1: Follow-up Activities

Extra Help

> Note: Students may do either Part A or Part B, or they may do both Part A and Part B.

Part A

1. Read the descriptions of the following changes. Decide if the change is sudden or slow. Then give an explanation for your answer. The first one has been done for you as an example.

   a. In 1906 an earthquake destroyed San Francisco, California. The shock was so violent that many people who were standing were thrown to the ground, and many people who were sleeping were thrown from their beds. The tremor was felt from Coos Bay, Oregon, to Los Angeles, California, a distance of about 1 100 km.

   Type of Change (sudden or slow): *sudden*

   Explanation:

   The movements described are powerful ones that occur over a short period of time. Earthquakes are usually over in a matter of minutes.

   b. In the year 79 AD, Mount Vesuvius, in Italy, erupted and covered Pompeii with more than 7 m of ash and lava. More than 2 000 people perished. People had been living near Mount Vesuvius for over 800 years. There is no record of a previous eruption.

   Type of Change (sudden or slow): *sudden*

   Explanation:

   The eruption occurred so quickly there was no time for the people to escape.

c. Records of Niagara Falls, kept since it was first described in 1678, show that the crest of the Canadian part of the falls has receded about 50 m every 100 years.

Type of Change (sudden or slow): *slow*

Explanation:

A change of that distance would be so slow that you would not notice the change if you watched for only a few hours or days.

d. The volcano Surtsey began to erupt in the ocean off the southwest coast of Iceland on November 14, 1963. Two years later, Surtsey was an island over 2 km^2 in area and 150 m high, with plants growing on it.

Type of Change (sudden or slow): *sudden*

Explanation:

The island must have appeared very quickly if after two years there were already plants growing on it.

e. The North Saskatchewan River winds through Edmonton, Alberta, in a deep wide valley. Bridges built years ago are still serviceable since the river's course has not changed greatly since the bridges were built.

Type of Change (sudden or slow): *slow*

Explanation:

The river continues to follow much the same course from year to year. The riverbanks have not changed substantially since the bridges were built.

f. The island of Hawaii consists of five great volcanoes grown together. They rise from the ocean floor to a height of more than 4 000 m above sea level. Two of the volcanoes, Mauna Loa and Mount Kilauea, still erupt occasionally.

Type of Change (sudden or slow): *sudden or slow*

Explanation:

Answers will vary. The changes could be interpreted either as fast or slow.

- *Sudden: Eruptions cause large quantities of materials to flow.*
- *Slow: The eruptions occur over a long period of time, each one building up the land mass a little more.*

Part B

2. Observe change in your neighbourhood. Look for three areas near your home that you can visit easily. You may select part of a garden, a grassy area on a slope, an area of earth beside a wall, a river bank, or any other areas where you think changes might occur.

   Watch for evidence of slow change and evidence of sudden change. Record your observations carefully at each location. Then classify the type of change as one of the following: no change, slow change, or sudden change.

   Give reasons for your classification.

   a. Neighbourhood Area One

Observations:

Answers will vary. The interpretation of each example should be similar to those given in previous examples. Two sample answers follow.

Type of Change ______________________________

Explanation:

b. Neighbourhood Area Two

Observations:

Sample Answer: A set of steps in an old building has hollows in the middle of each step where people place their feet.

Type of Change *slow*

Explanation:

The steps have been worn down slowly over a number of years.

c. Neighbourhood Area Three

Observations:

Sample Answer: A bank by a river valley has caved in.

Type of Change *sudden*

Explanation:

The side of the river bank gave away and slid down in just a few seconds.
OR
One day the bank was normal and the next it had caved in.

Enrichment

1. Read the following descriptions. Each description is followed by two possible inferences that explain the observations. Choose the better inference. Then briefly describe why you think it is better. Describe one additional observation you would like to make to support, modify, or reject the inference you chose.

   a. A 75-year-old building has steps made out of slate, which is a type of rock. The steps are worn down in the centre but show very little wear on their outer sides.

      Inference A: The material near the centre of the steps is softer than the material near the outside. This is why the steps wear down faster near the centre.

      Inference B: More people walk on the centre of the steps than on the outside. This is why the steps wear down faster near the centre.

      The more likely inference is *B*.

      Explanation:

      You can observe that people usually walk on the middle of the step.

      Additional observations or tests you would like to make to check your inference:

      Check the hardness of the steps near the middle and near the edges.

   b. The large valley located between Banff and Lake Louise has a fairly small river running in it.

      Inference A: The river was once much larger. This is why the valley is so big compared to the river.

      Inference B: The glacier at Lake Louise was once much larger and filled the wide valley. This is why the valley is so big compared to the river.

      The more likely inference is *B as it is the most correct response. Inference A could also be accepted, provided that the explanation is reasonable.*

      Explanation:

      It is reasonable to expect that B would be correct if the student is aware that most of Alberta was once covered by glaciers and that there are glaciers in the area even to this day.

Additional observations or tests you would like to make to check your inference:

Answers will vary. Sample answers:

- *One could look to see if there are any signs that glaciers have cut the valley (e.g. glacial grooves).*

- *One could look at the shape of valleys cut by glaciers and rivers and see which one this valley is most similar to.*

c. A paved bicycle path has several dandelions growing through it. There are lots of dandelions growing near the edge of the path. The path is three years old.

Inference A: When the path was paved, there were spots missed. The dandelions grew in these missed spots.

Inference B: The dandelions grew through the path by forcing up and cracking the path. This is why a few are now growing through the path.

The more likely inference is *either A or B. Both of these inferences are reasonable, though A is the more likely of the two.*

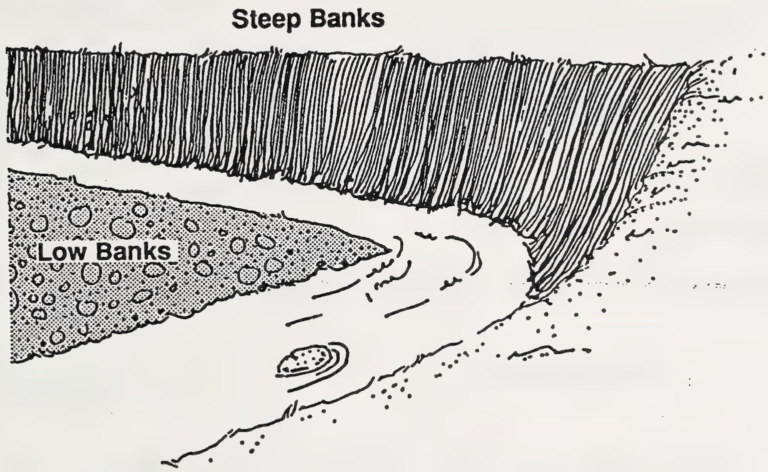
Explanation:

Inferences A and B both provide an explanation for why the dandelions are found in only a few places.

Additional observations or tests you would like to make to check your inference:

To have a better idea of what is happening, it would help to observe a path such as this one over a number of years to see if more dandelions appear by forcing their way through. It would also be helpful to see if a dandelion can grow through asphalt where at the start there is no opening.

d. The bank on the inside of a bend in a river is about 5 m above the river, then drops to an area that is fairly low and flat. On the outside of the bend, the bank is quite steep and is 5 m above the river. Where the river runs straight, the banks on both sides are about the same distance from the river.



Inference A: The river flows faster on the outside of a bend than on the inside of a bend. The faster running water on the outside of the bend cuts away at the bank more than on the inside of the bend.

Inference B: The bank on the inside of the bend is softer than the bank on the outside of the bend. The bank on the inside of the bend is more easily carried downstream by the river.

The more likely inference is *A*.

Explanation:

Answers will vary. Sample answer: When water reaches a bend in the river, it is guided around by the outside bank resulting in the formation of a steep bank. The inside bank is a gradual slope with a relatively low flat area just above the stream.

Additional observations you would like to make to check your inference:

Check the softness of the materials in the two banks of the river to see if the material is harder on one side than the other.

Note: There is no assignment for Section 1.
Students may go on to Section 2 at this point.

Section 2: Weathering

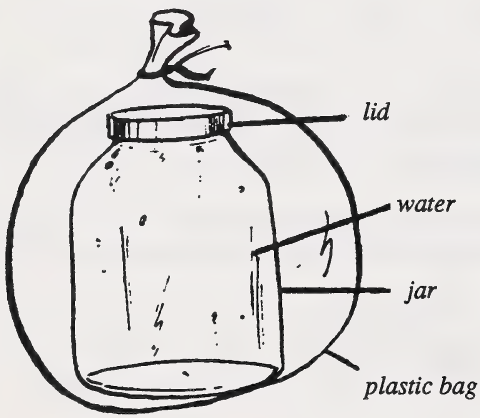
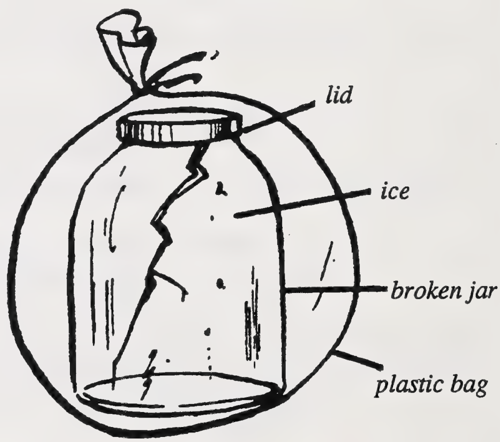
By the end of this section students should be able to

- explain what is meant by the term weathering
- recognize examples of weathering
- describe mechanical, biological, and chemical weathering
- identify variables that affect how fast something weathers

Section 2: Activity 1

Observations

In the following chart include drawings and descriptions of what you observed.

Before Freezing	After Freezing
	

Comments:

This demonstration of what water does when it freezes should help students understand what could happen to rock. The plastic container represents rocks with cracks in them. Conditions in a freezer represent a cold night when water freezes.

Questions to Answer

1. How could this kind of change cause rocks to split apart? What would have to happen?

   If there were cracks in a rock, water could get into the cracks. If the water were to freeze, the water would push the pieces of rock apart.

2. The container you used is much larger than many cracks in rocks. Explain why it would take a long time for water freezing and thawing in cracks to break rocks apart.

   Only a small amount of water will fit in a crack between two rocks, so the splitting only takes place a little bit at a time.

3. Why should you never store liquids in a glass bottle in a freezer?

   As the water freezes, it will expand and the container may break.

4. Use what you have learned so far in this activity about the mechanical weathering of rocks to help you answer the following questions.

   a. What is the first sign that mechanical weathering is taking place in rocks?

      Cracks begin to form in the rock.

   b. What causes this to happen?

      This is caused by repeated heating and cooling of the rock, which causes expansion and contraction over and over again.

   c. What further change takes place as mechanical weathering carries on?

      Water gets into the cracks and the cracks open wider.

   d. What causes this to happen?

      This is caused by water freezing in the cracks during cold nights or during winters.

5. Refer to question 4 when answering this question. Why do you think scientists need to include the first part of the explanation for weathering? (Can you explain this type of weathering by using only the second part of the explanation?)

   The first part of the explanation is needed to tell how the cracks get started.

6. Examine the top left photograph on page 302 of *Science Directions 7*. In Section 1, this photograph was used as an example of slow change. The photograph shows **strata** of rocks near Banff, Alberta.

   a. What evidence of weathering do you see in the rock strata?

      Answers will vary. Cracks can be seen in the rock. Also, one can see different lichens that are growing on the rock.

b. What additional evidence would you look for if you were able to visit the location?

Answers will vary.
Sample answer: Check to see if the cracks go all the way through the rock.

Section 2: Activity 2

Note: Students are to do either Part A or Part B.

Part A

Interpretations

1. Describe the colour changes that occur on the nail.

   The nail becomes covered with a dull reddish-brown layer.

2. Is the rust harder or softer than the iron nail?

   It feels softer. (It can be scraped off easily.)

3. What evidence is there that rust is a different material from iron?

   Answers will vary. The colour is different and the hardness is different.

4. Which is more easily broken into smaller pieces, the iron or the rust?

   The rust is more easily broken into smaller pieces.

5. a. Describe your observations.

   The chalk gradually comes apart and forms a little pile in the bottom of the bottle.

   b. Is this an example of mechanical or chemical weathering?

   It is an example of chemical weathering.

   c. Give a reason for your answer.

   There is a chemical that causes the change (soda pop). **or** *The original material is changed into another material.*

Part B

Chemical weathering involves changes that result in new materials. Read the following situations. Then make some interpretations. Answer questions 6 to 9.

Situation 1

You decide to build a doghouse for your new puppy. You take some wood and some iron nails outside. Just after you begin, it starts to rain, so you leave the supplies in the yard and run into the house.

The next day when you return, you notice that the nails are covered with orange spots. When you pick up a nail, the orange colour rubs off onto your hand. You realize that the nails have started to rust.

Interpretations

6. a. Is rust softer or harder than the iron nail?

   Rust is softer.

   b. How do you know?

   It rubs off on your fingers.

7. What evidence is there that rust is a different material from iron?

   The colour is different and the hardness is different.

8. Which is more likely to be broken into smaller pieces, the iron or the rust?

   The rust is more likely to be broken into smaller pieces.

Situation 2

Another day you are writing on a blackboard during lunch. You accidentally drop a piece of chalk into your glass of soda pop. You notice that the chalk starts to fizz. When you empty the pop out of the glass, you notice that the chalk is much smaller and has lots of tiny holes in it.

Interpretations

9. a. Is this an example of mechanical or chemical weathering?

   It is an example of chemical weathering.

   b. Give a reason for your answer.

   The original material is changed into another material.

Section 2: Activity 3

1. Predict what should happen as more and more gases from automobiles and industries are added to the air.

   Materials that are affected by these gases will be affected more strongly and more quickly.

2. Describe how scientists could test the prediction.

   Answers will vary. Scientists could compare the changes that take place in areas where there is very little emission of gases that cause acid rain, with changes that take place where there are large quantities of these gases.

3. Cleopatra's Needle is the name of a monument that was built in Egypt over 3 000 years ago. Egypt's weather is warm and dry. Until 100 years ago, the carvings on the sides of the monument were sharp and clear. In 1880, Cleopatra's Needle was taken to New York City. Its carvings are now badly worn down.

   a. Do the observations about Cleopatra's Needle support the idea of chemical weathering?

      Yes.

   b. Explain why or why not.

      Answers will vary. The observations show that the changes take place much more quickly in areas where there are many automobiles and other sources of air pollution.

4. Kim tried to explain chemical weathering to her grandfather. He smiled, then told her a story about gnomes. He described gnomes as small little old men who live in caves and guard buried treasure. The gnomes dig caves in limestone, leaving stalactites and stalagmites so that it is more difficult for their larger enemies to run through the caves. Gnomes have a magic power to make themselves invisible whenever people approach. Kim's grandfather also explained that what she called chemical weathering on the Earth's surface was really caused by the gnomes when they went out to search for more building materials. Gnomes chipped off small pieces of limestone, marble, and sandstone to build their cities in caves deep underground, much deeper than people have ever been.

   Kim told her grandfather that although she enjoyed the story about the gnomes, it still wasn't a scientific explanation. "Why not?" he asked her.

   Explain why the "gnome idea" is not a scientific explanation.

   Answers will vary. The explanation is not a scientific one because it cannot be tested. Science deals with what we can see and observe for ourselves and it must be testable.

Section 2: Activity 4

Note: Students are to do either Part A or Part B.

Part A

Plan a hike that will take you to a variety of locations. These locations might include an open field, an area with lots of trees, a stream or river bank, as well as locations near buildings. Look for examples of biological weathering. Keep notes so that you can describe three examples and explain what evidence there is that biological weathering has occurred.

1. a. Describe your first example of biological weathering.

   Answers will vary. Sample answer: A rock is found with some cracks in it.

   b. What evidence indicates that biological weathering has occurred?

   There are roots in the cracks.

2. a. Describe your second example.

   Sample answer: A rock is found with some lichen growing on it.

   b. What evidence indicates that biological weathering has occurred?

   The rock is very dull-looking on the outside.

3. a. Describe your third example.

   Sample answer: Some rocks were found at the front of a ground squirrel hole.

   b. What evidence indicates that biological weathering has occurred?

   Answers will vary. The rocks have been brought up by the squirrel. They do not appear to have gotten there by themselves.

Part B

4. Describe one example of mechanical weathering.

   Answers will vary. Sample answer: splitting apart of rocks by heating and cooling

5. Describe one example of chemical weathering.

   One example is the wearing down of rocks by acid rain.

6. Describe one example of biological weathering.

   An example of biological weathering is the splitting apart of rocks by roots.

7. How is biological weathering different from mechanical and chemical weathering?

   Answers will vary. Biological weathering involves the actions of living things.

8. How is biological weathering similar to mechanical and chemical weathering?

   Answers will vary. All cause the breakdown of rock materials.

9. How are rock, soil, and living things connected?

   Answers will vary. Many living things are found in rock and soil. Living things help change rock into soil. The minerals in the rock and soil provide nutrients to plants and animals.

Section 2: Activity 5

Read each of the following descriptions. Then make the necessary interpretations to try to explain how each change might have happened. If you have difficulty with some of the explanations, review the previous activities along with the associated textbook readings for this section to help guide you.

1. You take four pennies out of your pocket and look carefully at their colour. The pennies with dates of 1991 and 1990 are bright and shiny. The ones with dates of 1979 and 1982 are dark and dull. Explain what might have happened to the older pennies.

   Answers will vary. The change is caused by chemical weathering, which results from the exposure of the penny to the air and to the materials on people's hands.

2. You are walking in a newly developed part of a city. The concrete sidewalks are smooth and level. In the older part of the city in which you live, the sidewalks have lots of cracks, and some parts of the walk are raised up several centimetres. Explain what might have happened to the sidewalks in your part of the city.

   The sidewalks may have been affected by repeated heating and cooling and by the repeated freezing and thawing of water in cracks and under the sidewalk.

3. For your summer holidays you travel to Quebec. You notice that many of the cathedrals have metal steeples, of a green colour. The new church in your town in Alberta has a copper-coloured steeple. When you ask, you are told that all the steeples are made from copper. Explain what might have happened to the steeples in Quebec.

   The copper may be changed by combining with materials in the air, including pollutants.

4. When hiking through the woods, you see a large tree growing through a rock. The rock seems to be split into two parts. Explain what might have happened to the rock.

   Answers will vary. The crack may have been originally started by heating and cooling, then enlarged by water and enlarged further by plant roots.

Section 2: Follow-up Activities

Extra Help

> Note: Students may do either Part A or Part B,
> or they may do both Part A and Part B.

Part A

Imagine that you are a rock. Write an imaginary story about how you are changed into several pieces by weathering. Describe what happens to you. Use diagrams if you wish.

Use all of the words in the word list below. Try to use the words in a way that will show that you understand what they mean.

Word List

biological weathering	expand
calcium carbonate	ice wedging
carbon dioxide	mechanical weathering
chemical weathering	temperature
contract	

Write your story here. There is more space on the next page if you need it.

Breaking Up Is Hard to Do

Answers will vary. Students should show evidence of creativity as well as an understanding of the items listed.

biological weathering
calcium carbonate
carbon dioxide
chemical weathering
contract
expand
ice wedging
mechanical weathering
temperature

Part B

Fill in the blanks below with the words from the following word list. You will only use ten of the words. Draw a line through each word as you use it.

Word List

animals	limestone
biological	marble
calcium carbonate	mechanical
carbon dioxide	plants
carbonic	rock
chemical	soil
contract	temperature
expand	weathering
ice wedging	

1. The process of rocks being broken down into smaller pieces is called *weathering*.
2. *Biological* weathering involves the action of living things.
3. During *chemical* weathering solids change into different materials.
4. The weak acid that forms when rain mixes with *carbon dioxide* is called *carbonic* acid.
5. When solids are cooled, they *contract*.
6. Cracks can form in rocks during changes in *temperature*.

7. Water will *expand* when it freezes.

8. *Limestone* and *marble* are types of rock that are affected by chemical weathering.

9. a. List the seven words that you did not use.

   animals
   calcium carbonate
   ice wedging
   mechanical
   plants
   rock
   soil

   b. Write a sentence using three of these words. Try to use the words to show that you understand one way the three words are connected.

   Answers will vary. Sentences should contain any three of the words in (a).

Enrichment

Make the necessary interpretations to answer the following questions.

1. The coal mine underneath Turtle Mountain may have helped to cause the Frank Slide. The night before the slide, the weather was very cold, with a heavy frost. Explain how weathering might also have helped cause the slide.

   The cold weather may have caused some of the rocks on the outside of the mountain to contract. It may also have caused some water to freeze in the cracks, causing rocks to split apart and break loose.

2. What evidence would you look for to help prove or disprove your explanation for question 1? Explain how the evidence would help.

   Answers will vary. Evidence of cracks in the rock might help show what happened.

3. Imagine you work at a garden centre that sells large planters for growing flowers in the summer. You must explain to the people who buy your planters why they should empty them before the winter, or at least make sure the material in the planters is quite dry. Write an explanation for the buyers of your planters.

   The point to be made here is that the water in the soil may freeze on cold nights and expand as it freezes, breaking the planters.

Note: The student should now complete the assignment for Section 2 in the Module 6 Assignment Booklet.

Section 3: Erosion By Water

By the end of this section students should be able to

- recognize evidence of water erosion
- describe and classify sediments
- explain why river courses change
- explain why shorelines change
- describe how a river ages
- compare porosity of soil samples

Section 3: Activity 1

Note: Students are to do either Part A or Part B.

Part A

Comments:

As the learning facilitator, your assistance in helping the student set up the stream table will be required. If a stream table is not available, you may assist students with doing Part B.

Observations

Answers will vary. The following are example answers.

Flow of Water	Effect on Rock Fragments
dripping	*Some sand grains are moved when the water drops hit them.*
gentle flow	*Some of the sand grains are carried down the slope.*
medium speed	*The sand and some of the small pieces of gravel are carried down the slope.*

Questions to Answer

1. What happened to each size of rock fragment when the water ran slowly?

   - sand *There was some movement of the sand.*
   - gravel *There was no movement of the gravel.*
   - pebbles *There was no movement of the pebbles.*

2. What happened to each size of rock fragment when the water flowed more quickly?

   - sand *There was movement of the sand downslope.*
   - gravel *There was some movement of the gravel downslope.*
   - pebbles *There was little or no movement of the pebbles.*

3. Predict what might happen to each size of rock fragment if you increased the steepness of the slope of the stream table.

   - sand *The sand would move much more quickly.*
   - gravel *The gravel would move more quickly.*
   - pebbles *The pebbles would begin to move.*

4. Describe how you would go about experimenting to test the effects of moving water on different slopes of sand.

   Observe how much of each kind of material is carried when the slope of the stream table is not very steep. Then change the slope and observe again to see how much of each type of material is carried.

Part B

Observations

Answers will vary. The following are example answers.

Speed of Water	Effect on Rock Fragments
very slow	– *some slight movement of sand grains* – *no movement of gravel and pebbles*
slow	– *movement of sand grains* – *slight movement of pebbles* – *no movement of gravel*
medium speed	– *sand grains move more quickly* – *some movement of gravel* – *very little movement of pebbles*

Questions to Answer

5. What happened to each size of rock fragment when the water was moving very slowly?
   - sand *There was some movement of the sand.*
   - fine gravel *There was very little movement of the fine gravel.*
   - pebbles *There was no movement of the pebbles.*
6. What happened to each size of rock fragment when the water flowed more quickly?
   - sand *Movement of sand became more noticeable and more rapid.*
   - fine gravel *There was some movement of the fine gravel.*
   - pebbles *There was slight movement of the pebbles.*
7. Predict what might happen to each size of rock fragment if you swirled the water as fast as you could.
   - sand *There would be rapid movement of the sand.*
   - fine gravel *There would be more noticeable movement of the fine gravel.*
   - pebbles *The pebbles would move along with the other materials.*

8. Imagine that stream *A* flows down a very steep slope through a mixture of sand, pebbles, and fine gravel. Stream *B* flows down a nearly level slope through similar material. Predict what you would expect to see being carried by each of these streams. How can the *jar* model you just used help you predict differences in what will happen to the rock fragments in each stream?

   - *Stream A would likely cause some movement of sand, fine gravel, and pebbles. The movement of sand would be quite rapid.*

   - *Stream B would have very little movement of materials, mainly a very gradual movement of sand grains.*

Section 3: Activity 2

Observations

1. a. Did the big rock fragments settle near the bottom or near the top of the jar?

   They settle mainly near the bottom.

   b. Why?

   They stop moving most quickly. (They are also the heaviest pieces.)

2. a. Did the small rock fragments settle near the bottom or near the top of the jar?

   They settle mainly near the top.

   b. Why?

   They do not stop moving as quickly and they do not settle out as fast because they are smaller and lighter.

Interpretations

3. As a fast river begins to slow down, rock fragments start to settle on the bottom of the river. In what order will the following rock fragments settle?

   sand, fine gravel, silt, pebbles, clay

   List the rock fragments from the first to settle to the last to settle.

first to settle	*clay*
	silt
	sand
	fine gravel
last to settle	*pebbles*

4. Imagine that you are in a valley with no water flowing through it. You are trying to figure out if a river once flowed through the valley. Think about each of the following observations. Look back at the information in this activity if you need help.

   If the observations support the idea that a river once flowed through the valley, write *yes* in the space. If the observations do not indicate that a river once flowed through the valley, write *no* in the space. Then briefly explain your answer.

   a. *Yes* You find lots of smooth, well-rounded pebbles and gravel.
   Explanation:

   Pebbles are found where they are laid down by rivers. Pebbles are smoothed and rounded as they rub against each other in the stream bed.

   b. *Yes OR No* There are lots of bushes and grass.
   Explanation:

   The grass and bushes could be growing on soil and sediments laid down by the river. They may also have been deposited in another way.

   c. *Yes* The valley is shaped like a large "V."
   Explanation:

   This is the shape of a young river valley.

   d. *Yes* There is a lake shaped like a "C," with no water flowing into or out of the lake.
   Explanation:

   This is a place that once was a part of a river (an oxbow lake).

   e. *No* There is a very large boulder, about the size of a large truck, sitting on the ground.
   Explanation:

   Rivers cannot move material this size.

5. Think back to the experiments you did with rock fragments and water. Describe what the sediments in a **delta** might look like if you dug down. What kind of material might be found in the delta? What kind of material might be found farther out in the water, just beyond the delta?

   One might expect to find a variety of materials carried by rivers, including gravel, sand, silt, and clay. The smaller sized materials tend to be carried further out.

Section 3: Activity 3

In the space provided, describe changes that can occur in shorelines. Use diagrams if you wish. In your description, show that you understand the difference between erosion and deposition and how they work together to change shorelines.

Answers will vary.

Shoreline movement involves the movement of sediments from one location to another, caused by the action of currents. The action of waves can help break down the shoreline in one area and can also serve to help wash up the materials on another shore.

The two main processes involved are erosion, which is the process by which shoreline materials are broken down and picked up by the water, and deposition, which is the process in which the materials settle out of the water, usually in a place different from where they started.

Section 3: Activity 4

Comments:

Dry clay is often difficult to obtain as a soil since water makes it stick together in hard lumps. Collect the clay beforehand and allow it to dry. Then smash the lumps with a hammer before using the clay in this investigation.

Observations

<table>
<tr><th>Soil Sample</th><th>Amount of Water Added (mL)</th></tr>
<tr><td>dry gravel</td><td rowspan="5">Answers will vary. Usually the dry clay will absorb the least water, since there are only small spaces between the fine particles of clay. Gravel should hold the most water as larger particle sizes have larger spaces between them.</td></tr>
<tr><td>dry sand</td></tr>
<tr><td>dry potting soil</td></tr>
<tr><td>dry garden soil</td></tr>
<tr><td>dry clay</td></tr>
</table>

Questions to Answer

1. List the soil samples from highest porosity to lowest porosity.

   highest porosity

   Answers will vary. Answers should be consistent with the results given in the Observations chart. Gravel should have the highest porosity and clay the lowest porosity.

   lowest porosity

2. a. Through which type of soil material will water flow quickest?

   Usually water will flow quickest through the gravel.

   b. Why?

   Generally, there is a lot of space between pieces of gravel.

3. a. Predict how much water you could add to a sample that was half gravel and half sand.

   Answers will vary. Students will likely predict a result halfway between the two results obtained in the Observations chart, but the result will probably be different than predicted.

   b. Try mixing equal amounts of sand and gravel. Then add water to fill the container. What amount of water did you need to add?

   The result will be less than for sand or gravel.

   c. Was this what you expected? *Answer can be yes or no, depending on the prediction in a..* If it was different, try to explain the difference.

   The sand filled some of the spaces between pieces of gravel.

4. a. Which type of soil would have most runoff after a rainfall?

   Most likely the clay will have the most runoff.

   b. Explain why.

   The clay would likely be least able to absorb all of the water.

5. a. Which type of soil would contain the most groundwater after a rainfall?

   Most likely the gravel would contain the most ground water.

   b. Explain why.

   There are more large spaces in the gravel than for other materials.

Section 3: Activity 5

Comments:

Large baking trays may work well as the container to hold the sand and water. However, if students are finding that baking trays are not deep enough, then they may wish to try a baby's bathtub to see if it works better.

Clean, course sand works best for this investigation as it allows water to flow quickly through it.

Observations

1. When water was first poured onto the sand, where did it go?

   It went directly into the sand, filling in the spaces between the particles. The excess water settles at the bottom of the container and then begins to accumulate.

2. Which hole first showed water?

   Answers will vary. If the sand used is not very clean, the deeper hole or well most likely showed water first since it is closest to the water source. However, if the sand that was used was clean (that is, it didn't have finer materials filling in the spaces between the particles), then the lowest depression (the lake) likely showed the water first.

3. Where did water appear next?

   Answers will vary. Water would most likely have appeared next in the "lake" or "slough," if the student said water had appeared first in the deep well in the answer to question 2.

4. Where did water appear last?

   Most likely the water appeared last in the shallow well.

Interpretations

To answer questions 5 to 10, you will need to apply what you learned about the behavior of groundwater from your model set up.

Read the captions and examine diagrams (**a**), (**b**) and (**c**) on page 331 of your textbook. Answer the following questions which help explain the behavior of the groundwater in Johann's and Cheryl's camp as shown in the diagrams.

5. When the rain fell in the spring, what happened to it?

   Some of the water became runoff, but most went into the ground. It filled the wells, the lake, the slough, and the stream.

6. How did water get into the wells, streams, and slough?

   It travelled through the ground. Groundwater collects underground and raises the water table. The sloughs and streams are depressions in the ground. The water table meets the surface here.

7. Why was one of the wells dry when Cheryl visited the camp?

   The water table had dropped during the summer.

8. What happened to the slough in the summer?

   It went dry.

9. How does the *water table* model help explain the appearance and disappearance of surface water?

   The water appears and disappears as the water table rises and falls.

10. Why do scientists use models?

    Answers will vary. Models help us gain ideas about how the real world works. Models can help us understand what we see. Often they are useful in predicting what will happen as conditions change.

Section 3: Follow-up Activities

Extra Help

Look at the following word list. If you do not know what a word means, look back through this section to find out how the word is used.

Word List

boulders	observation	shore
canyon	oceans	shoreline
clay	oxbow	silt
delta	pebbles	snow
deposition	pores	soil
erosion	porosity	steep
flood	rain	stream
gravel	river	surface
groundwater	rock	table
inference	runoff	tributaries
lake	sand	water
meandering	sediments	weathering
model	soil	valley

Once you think you understand the words, test yourself by doing the following crossword puzzle. Some of the clues may seem to fit more than one word. You will not use all the words. A word is used only once in the crossword puzzle. Do the crossword, using a pencil so that you can change words to make everything fit.

Across Clues

4. sediment larger than sand

7. a form of moving water that causes erosion on the Earth's surface

8. sediment larger than sand

9. Runoff is called *surface* water.

11. one source of runoff

13. what waves erode

14. the type of river that winds back and forth on a fairly level surface

15. a collection of sediment often found where a river enters an ocean

16. wearing away of rock and the moving of the rock fragments from one place to another

18. a source of runoff

19. A river flowing down a *steep* slope carries lots of rock fragments.

20. what happens when more runoff enters a river than it can hold

23. the holes into which groundwater seeps

24. the name for streams that flow into rivers

Down Clues

1. As a stream or river slows, rock fragments settle to the bottom.

2. a lake formed from a meandering river

3. sediment smaller than sand

4. water contained in the soil

5. one place where a delta might form

6. rock breaking down into smaller pieces

10. a landform that has very steep sides, caused by river erosion

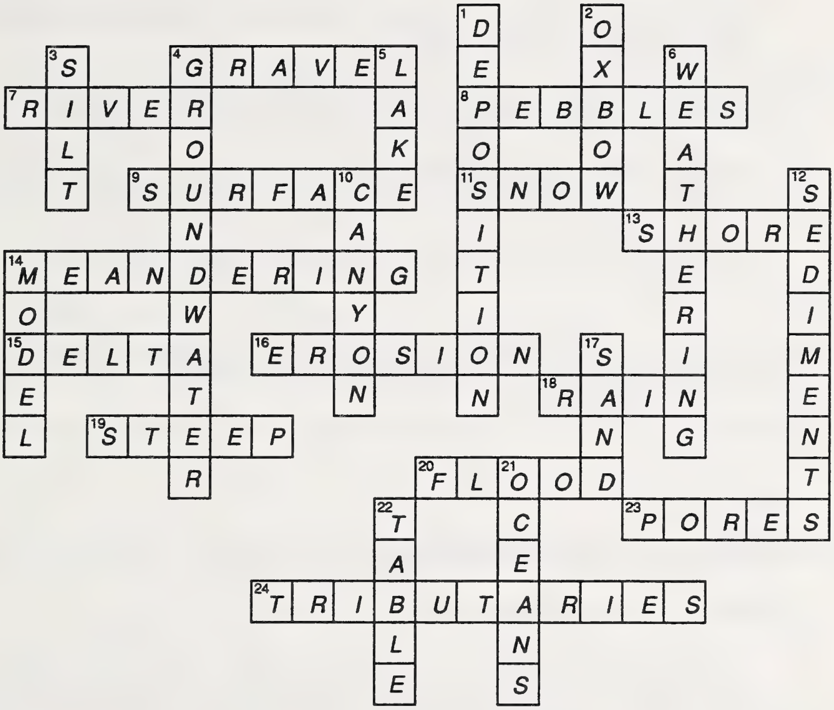
12. rock fragments deposited by a river

14. A stream table can be used to make a *model* of a river.

17. sediment larger than clay and silt

21. the largest bodies of water on Earth

22. The water *table* is the level at which the soil cannot hold any more groundwater.



Enrichment

Comments:

For this activity students are to follow the instructions for Activity 6-6 which is described on page 313 of *Science Directions 7*. Leadshot was suggested as the substitute for gold. Another substitute that can be used is small fishing weights. These may be cut with scissors to make "gold nuggets" of various sizes. After completing steps 1 to 5 given under the Procedure, students are to make the necessary interpretations to answer some questions.

1. Why were you able to separate the "gold" from the other rock fragments?

   The "gold" is heavier and tends to settle in the bottom of the pan.

2. What force pulls particles to the bottom of moving water?

   Gravity pulls particles to the bottom of moving water.

3. What force keeps particles from settling out of the water?

   The force of the moving water keeps particles from settling out. (Some students might mention that lighter particles are more buoyant than heavier particles.)

4. How do these two forces act together to allow you to find and remove the lighter substances after swirling them around in the water?

   The lighter substances are carried by the water and the heavier substances settle out.

5. Imagine that you find an old river bed where a river once was but has now dried up. How could looking at the sediments help you infer what the size and speed of the river used to be?

   The larger the sediments, the faster the stream was; the smaller the sediments, the slower the stream was.

Note: The student should now complete the assignment for Section 3 in the Module 6 Assignment Booklet.

Section 4: Erosion by Wind

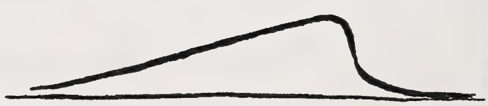
By the end of this section students should be able to

- identify the features that result from wind erosion
- understand how wind erosion affects Alberta and how it can be controlled

Section 4: Activity 1

Observations

Answers will vary, but should be similar to those shown.

Before Blowing Dry Sand	After Blowing Dry Sand
	

Observations (continued)

Before Blowing Wet Sand	After Blowing Wet Sand
	 *(little or no change)*

Interpretations

1. What are the two most important factors you have discovered that determine how much wind erosion occurs in a certain area?

   - *the speed of the wind*
   - *the dryness of the soil*

2. Predict how a sand dune might move if the wind continues to blow in the same direction for a long time.

   Answers will vary. Likely the dune will be moved downwind.

3. Predict what will happen to soil being carried on the wind if the wind meets a solid object, such as that depicted in the following diagram.

Some of the soil is likely to be deposited on the downwind (leeward) side of the obstacle, but very little, if any, on the upwind (windward) side.

Section 4: Activity 2

Comments:

If it is wintertime and soil particles of different sizes, such as sand and garden soil aren't readily available, students can try using other easily available materials, such as a mixture of uncooked rice and other cereal grains, to represent the soil samples. To help speed the cleanup after the investigation students can place open sheets of newspaper on the area where this investigation is to be done.

Observations

Answers will vary. When the blower is turned on, it is likely that some of the soil materials will be moved, especially if they are dry. Some of the finer material and organic matter are likely to be moved the first and also the farthest.

Observations (continued)

Answers will vary. When the obstacle is placed in the path of the wind made by the blower, the material carried along by the wind is largely deposited on the downwind side of the obstacle.

Interpretations

1. Explain why some soil samples were blown farther than others (step 2).

   This usually depends on the size of the particles and also whether the particles are mineral material or some form of organic material.

2. Predict what would have happened if you had used the hair dryer at a higher speed.

   Likely the movement would have been greater. More material would have moved and it would have been transported a greater distance.

3. Predict what would have happened if you had dampened the soil samples before you used the hair dryer.

   Likely the materials would not have moved as far.

4. Explain what happened when the cup was placed in the path of the wind.

   The cup caused an area where the wind was blocked. In this area, the material could fall and stay without being blown away again.

5. How could planting trees reduce soil erosion by the wind?

   Trees would help by creating wind blocks, or at least they would slow down the wind in the area near them.

Comments:

There are no Follow-up Activities for this section.

> Note: The student should now complete the assignment for Section 4 in the Module 6 Assignment Booklet.

Section 5: Erosion By Glaciers

By the end of this section students should be able to

- describe how glaciers develop
- describe how glaciers move
- identify the range and location of glaciers, past and present
- infer erosion by glaciers from landscape features

Section 5: Activity 1

Interpretations

1. Observations made during the last 100 years show that valley glaciers are getting smaller. What would have to change for them to start getting larger and moving farther out into valleys?

   The climate would need to become colder and/or snowfall would need to increase.

2. What is the same about valley glaciers and continental glaciers?

   They are both formed from snow that builds up into thick layers of ice. They would both move due to gravity and pressure.

3. What is different about valley glaciers and continental glaciers?

   Continental glaciers have very little movement, whereas valley glaciers move downslope.

4. Why are valley glaciers called *rivers of ice*?

   They are called this because they move gradually downslope, the way a river would.

5. Why is it hard to believe that glaciers are spreading across continents or flowing down valleys?

   The movement of glaciers is so slow that it often is not directly observed. Also, the front of the glacier may seem to stay in one place as the melting keeps pace with the advance of the glacier.

Section 5: Activity 2

Comments:

Students are to examine the illustration on the bottom of pages 334 and 335 of the textbook to answer the questions in this activity.

1. a. In which part of the illustration was the **snout** of the glacier **stationary**?

   The two centre pictures show a stationary glacier.

   b. What weather conditions must be present for a glacier to be stationary?

   The weather must be neither very warm nor very cold. Over time the snow falling must equal that melting.

2. a. In which part of the illustration was the front of the glacier **advancing**?

   The two pictures at the left show an advancing glacier.

   b. What weather conditions are likely present for a glacier to be advancing?

   The weather must be fairly cool or cold. Snowfall must exceed the amount melting.

3. a. In which part of the illustration was the front of the glacier **retreating**?

   The two pictures at the right show a retreating glacier.

   b. What weather conditions are likely present for a glacier to be retreating?

   The weather must be fairly warm or hot. The amount of ice melting must be greater than the snowfall accumulating.

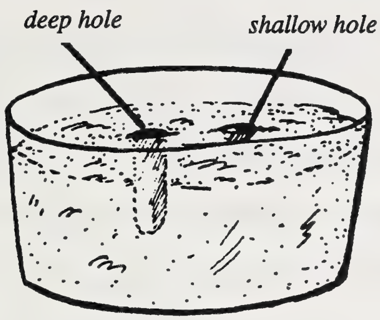
Section 5: Activity 3

Comments:

- In additon to ordinary ice cubes, students will need to prepare some ice cubes made from water mixed with coarse sand, and some made from water mixed with gravel. These should be prepared beforehand so that they are ready when the student is doing this activity.

- Students may use diagrams as part of their description of what they observed.

Observations



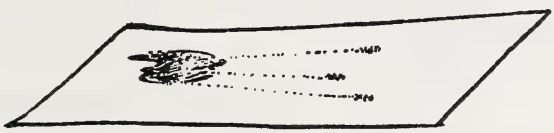
For the ice cube that was buried, a fairly deep hole was formed. For the ice cube that was pressed into the sand, a shallow hole was formed.

Observations (continued)

Clear Ice Cube

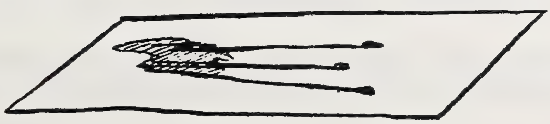
The only effect of the ice cube was to make the cardboard a bit wet.

Ice Cube with Sand Frozen in It



The sand made small scratches in the cardboard.

Ice Cube with Gravel Frozen in It



The gravel made some fairly deep scratches in the cardboard.

Questions to Answer

1. Which parts of this activity simulated making striations?

   The moving ice with the sand and gravel inside simulated making striations.

2. Which parts of this activity simulated making kettle lakes?

   The ice cubes left to melt in the sand simulated making kettle lakes.

3. a. Which pieces of evidence show the direction that a glacier was moving before it melted?

      The scratches (striations) show the direction of movement.

   b. How do they show the direction?

      The lines go in the same direction as the movement.

4. Describe one way that river erosion is similar to erosion by glaciers.

   Answers will vary. River erosion can cause the movement of materials from one place to another.

5. Describe one way that river erosion is different from erosion by glaciers.

   Glaciers can move larger materials.

6. Consider what you have learned about how glaciers form and move. Explain how large rocks can be moved many kilometres to areas where there are no glaciers?

   Glacial movements pushed the boulders to their present location. Then the glaciers melted back from where they once were.

Section 5: Follow-up Activities

Extra Help

1. How can an advancing glacier carry rocks down the valley?

   An advancing glacier can push rocks at its front as well as carry rocks on top, inside, and under the glacier.

2. How can a stationary glacier carry rocks down the valley?

   The glacier is moving downslope even as the front of the glacier is retreating. Materials can be carried on, in, or under the glacier.

3. What force makes a glacier move down a valley?

   Gravity moves the glacier down a valley.

To simulate how a continental glacier flows outward, form some modelling clay into a block that is about 5 cm on every side. Place the block on a sheet of paper and trace the outline of the block. Add some weight to the top of the modelling clay block (a small book will work). Leave the clay for 15 minutes. Trace the outline around the clay again. Peel the clay off the paper and compare the outlines.

4. Describe how the modelling clay changed.

   If the weight was sufficient, the modelling clay spread out as it was flattened by the weight.

5. What would cause a continental glacier to quit spreading outward?

   If there were not enough snow to keep pace with the yearly rate of melting, the glacier would stop spreading.

6. Following is a list of landscape features mentioned in this module:

deltas	rounded pebbles
drumlins	rough-edged pebbles
erratics	sand dunes
kettle lakes	V-shaped valleys
moraines	wide U-shaped valleys
oxbow lakes	

   List the six features that would indicate that a glacier has been present.

   - *drumlins*
   - *erratics*
   - *moraines*
   - *kettle lakes*
   - *U-shaped valleys*
   - *rough-edged pebbles*

Enrichment

Note: Students may do either Part A or Part B, or they may do both Part A and Part B.

Part A: Researching Glacial Features

Two features caused by a glacier are a cirque and an esker. Do some research; then describe what each looks like and how each was made by a glacier. Use the space provided.

A cirque is a rounded, bowl-shaped valley formed on the slope of a mountain by a mountain glacier.

An esker is a winding ridge of sediment (sand, gravel, and so on) believed to have been deposited by meltwater streams flowing under retreating Ice Age glaciers.

Part B: Researching a Part of Alberta Not Covered by Glaciers During the Last Ice Age

The tops of the Cypress Hills in Alberta and Saskatchewan were not completely covered with ice during the last Ice Age. Some of the plant and animal species living today in the Cypress Hills are different from those in the surrounding lowlands. How can you explain these differences? First, propose your own explanation based on what you have learned in this section. Then try to find one in a library. A book that describes the geography of Alberta or one that describes the geology of Alberta may be a good source. Was your explanation similar to the one you found?

Answers will vary. The main idea students should develop is that the life forms that existed before glaciation were for the most part displaced from Alberta, except in the Cypress Hills area.

Note:
1. The student should now complete the assignment for Section 5 in the Module 6 Assignment Booklet.
2. Check to see that all the assignments have been completed and that all written work is done neatly in blue or black ink. Diagrams may be left in pencil.
3. The completed Assignment Booklet should now be submitted to the Alberta Distance Learning Centre for correction.
4. The student should be reviewing all previously completed modules in preparation for the final test.

***Learning Facilitator:** Please work with your student to evaluate this course and return this survey with your last Assignment Booklet. This is a course designed in a new distance-learning format, so we are interested in your responses. Your constructive comments will be greatly appreciated so that a future revision may incorporate any necessary improvements.*

COURSE SURVEY FOR SCIENCE 7

Name ____________________ File Number ____________________

Address ____________________ Telephone Number ____________________

____________________ Age ____________________

____________________ Date ____________________

A. Rate each of the following aspects of the course by checking the appropriate box. (If you strongly agree with the statement check 5. If you partially agree check 4, if you feel neutral check 3, if you partly disagree check 2, if you strongly disagree check 1.)

	5	4	3	2	1
1. The course was interesting.	❑	❑	❑	❑	❑
2. The main ideas were explained well.	❑	❑	❑	❑	❑
3. The directions for the activities were clear.	❑	❑	❑	❑	❑
4. There is a variety of activities.	❑	❑	❑	❑	❑
5. The amount of work was reasonable.	❑	❑	❑	❑	❑
6. It was easy to read and understand.	❑	❑	❑	❑	❑
7. The extra-help and enrichment activities were helpful.	❑	❑	❑	❑	❑

B. 1. This course contained a series of Module Booklets and Assignment Booklets. Do you like the idea of separate booklets?

____

____

2. Have you ever enrolled in a correspondence course that arrived as one large book?

❑ Yes ❑ No If yes, which style do you prefer?

____

____

Name of Student ____________________ Student I.D. # ____________________

Name of School ____________________ Date ____________________

3. Companion audio programs are included in the course. Did you find them helpful?

   ❑ Yes ❑ No Comment on the lines below.

   ____

   ____

4. Suggestions for video-tape activities are included in the course. Were you able to use these activities?

   ❑ Yes ❑ No Comment on the lines below.

   ____

   ____

5. The answers for the activities in the Module Booklets were placed in the Student Support Guide. How well did you work as a team?

   Student's comments:

   ____

   ____

   Learning Facilitator's comments:

   ____

   ____

6. Did you contact the Alberta Distance Learning Centre for help or information while doing your course?

   ❑ Yes ❑ No If yes, approximately how many times? ____________

   Did you find the staff helpful?

   ❑ Yes ❑ No If no, explain.

   ____

   ____

Name of Student ____________	Student I.D. # ____________
Name of School ____________	Date ____________

7. Were you able to fax any of your assignments?

❑ Yes ❑ No If yes, comment how it speeded up completion of your course.

____

____

8. If you were mailing your assignments, how long was it taking for Assignment Booklets to return?

____

9. Was the feedback you received from your distance learning teacher helpful?

❑ Yes ❑ No Comment on the line below.

____

10. What did you like least about the course?

____

____

11. What did you like most about the course?

____

____

Additional Comments

____

____

____

Thanks for taking the time to complete this survey. Your feedback is important to us.

Name of Student ____________________ Student I.D. # ____________

Name of School ____________________ Date ____________

Science 7
St. Support Guide
Module 6

L.R.D.C.
Producer

FIRST EDITION
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